and having extreme height of 15° above the horizon at the centre, and from 8° to 10° broad. Beneath this was the dark segment, which, in this case, may have been stratus cloud. When noticed, at 2.20 a. m., there was a single bright streamer 20° west of north and extending 30° toward the zenith. At frequent intervals there were seen flashes of lightning at the upper edge of the dark segment, betokening possibly a storm to the northward. At 3.17 a. m., the arch brightened up and a few faint streamers were seen, having a lateral motion from east to west. The light of the waning moon undoubtedly interfered in part with the display.

Fort Myer, Virginia, 5th: From 8.30 to 11.15 p. m., bright auroral beams, reaching an altitude of 30°, were observed in the northern sky.

Rochester, New York, 5th: At 9.30 p. m., a brilliant aurora, of pale yellow color changing to bright red, was observed in the northeastern sky. It consisted of numerous slender beams, which occasionally shot upward to within a few degrees of the zenith. The dispiay ended at 2.30 a. m., of the 6th.

Erie, Pennsylvania, 5th: At 8.40 p. m., an aurora was observed, consisting of waves of bright light flashing to the zenith. The display ended at 1.15 a. m., of the 6th.

Chicago, Illinois, 5th: At 9.15 p. m., a faint auroral glow, extending from 15° west of north to 25° east, and to an altitude of 25°, was observed in the northern horizon. At 10.30 p. m., faintly-defined streamers shot upward in the north to a height of 35° and slowly faded away. Later, an arch was formed which extended from northwest to southeast. It was apparently about the width of an ordinary rainbow but was wider at the extremities. The display ended at 11. p. m.

Dubuque, Iowa, 5th: At 8.55 p. m., an aurora was visible in the north; at 10.18 p. m., a bright band shot upward from the west with no visible connection with the light in the north. This band appeared instantaneously, passing about 10° south of the zenith and reached the horizon. It remained intact for thirty minutes, when it moved slowly southward and gradually broke up about 15° south of the zenith. The eastern part disappeared first, leaving the western end visible, which resembled an immense feathery plume. During the presence of this band, the light remained in the north, and after its disappearance, a few streamers were observed.

Northfield, Minnesota, 5th: Bright auroral arch at 11.00 p. m.

Tobacco Garden, Dakota, 5th: Aurora visible at 7.30 p. m. At 9.00 p. m., streamers and curtains of light were very brilliant. At that hour, the aurora extended over about 105° of the horizon and to an altitude of 45°; at 9.15 p. m., it covered over 180 ° of the horizon and extended to the zenith.

Fort Keogh, Montana, 5th: At 8.10 p. m., an aurora of pale yellow color, was observed, extending from northwest to northeast and to an altitude of 40°. A few streamers appeared between 10.20 and 10.30 p. m., having a motion from northwest to northeast. Soon after this time, the display faded away.

Fort Benton, Montana, 5th: From 8 to 10 p. m., an aurora was observed, extending from northwest to northeast. It consisted of streamers and tremulous waves of straw-colored light.

Fort Washakie, Wyoming, 5th: At 7 p. m., a pale circular light was observed. At 8.10 p. m., a well-defined aurora was visible, which increased in brilliancy until 9.00, when beams appeared, shooting upward with a quick longitudinal movement. The display ended at 10.00 p. m.

Umatilla, Oregon, 5th: At 7.30 p. m., an aurora was observed, consisting of slender luminous beams, reaching an altitude of 15°. It was most brilliant from 7.50 to 8.50 p. m., after which time it faded away somewhat, but it was reported to be very brilliant between 1.00 and 2.00 a. m., of the 6th. The display continued until 5 a. m.

There were other displays, of less extent and brilliancy, during the month. They occurred on the following dates: 3d, 4th, 6th. 8th, 10th, 11th, 12th, 14th, 15th, 16th, 22d, 23d. The most noteworthy of these was the display of the 4th, which was observed at stations east of the eighty-second meridian to the Atlantic, and as far south as Kittyhawk, North Carolina.

Professor C. Carpmael, superintendent of the meteorolgical service of the Dominion of Canada, reports auroral displays, which were not observed in the United States, on the following dates: 9th, 21st, 27th 28th.

THUNDER-STORMS.

Thunder-storms were reported in the various districts on the following dates:

Middle Atlantic states: 23d, 24th, 27th, 28th.

South Atlantic states: 10th, 11th, 20th, 23d, 28th to 31st.

Florida peninsula: 1st, 3d, 7th, 8th, 9th, 13th, 31st.

East Gulf states: 1st, 7th, 8th, 12th, 13th, 18th, 29th, 30th, 31st.

West Gulf states: 1st, 5th to 9th, 12th to 16th, 18th, 28th, 29th.

Rio Grande valley: 3d, 5th, 8th, 15th.

Ohio valley and Tennessee: 1st, 2d, 3d, 7th, 8th, 12th, 13th, 27th to 31st.

Lower lake region: 5th, 9th, 13th, 27th to 31st.

Upper lake region: 3d to 7th, 9th, 12th, 13th, 20th, 28th, 30th.

Extreme northwest: 1st, 3d to 6th.

Upper Mississippi valley: 1st to 8th, 11th, 12th, 13th, 15th, 26th, 27th, 28th, 30th, 31st.

Missouri valley: 1st to 12th, 14th, 15th, 16th, 27th, 28th, 30th, 31st.

Northern slope: 1st to 5th, 9th, 11th.

Middle slope: 2d to 7th, 9th, 11th, 12th, 15th, 16th, 27th, 28th, 30th, 31st.

Southern slope: 2d to 7th, 10th 15th, 16th.

Thunder-storms were also reported from the following stations not included in the districts named above: Coalville, Utah, 2d; Tucson, Arizona, 3d; Santa Fé, New Mexico, 1st; Colfax, Washington Territory, 15th; Red Bluff, California, 1st; Portland, Oregon, 10th.

The following instances of damage by lightning during thunder-storms have been reported:

Mobile, Alabama, 31st: A flag staff, used for the display of storm signals, was struck by lightning and demolished.

Port Eads, Louisiana, 1st: At a 2.00 a. m., during a heavy rain and thunder storm, the carpenter shop of the Jetty company was struck by lightning and burned, entailing a loss of from $6,000 to $7,000.

Logansport, Indiana, 28th: A building near the Signal office, was struck and damaged by lightning.

Springfield, Illinois, 28th: Building struck and damaged by lightning.

Wicklow, Dakota, 11th: A house was struck and injured by lightning.

Fallsington, Pennsylvania, 27th: During a thunder-storm at Yardleyville, near this place, a barn was struck by lightning and burned, in which were eight cows, four horses, crops and farming implements, all of which were destroyed.

Pierce City, Missouri, 29th: During the storm last night, the lightning struck a barn, four miles from here, killing one man and four horses.

Hagerstown, Ohio, 31st: A barn near here was struck by lightning during a thunder storm and totally destroyed. Loss about $2,000.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts, on the following dates:

New England: 2d, 9th, 15th, 20th, 21st, 27th, 30th.

South Atlantic states: 1st, 3d, 8th, 10th.

Ohio valley and Tennessee: 1st, 2d, 3d, 5th, 7th, 13th, 18th, 25th, 26th, 28th.

Lower lake region: 13th, 22d, 25th, 26th.

Upper lake region: 2d, 18th, 20th, 21st, 23d, 25th, 26th.

Upper Mississippi valley: 1st, 4th to 7th, 14th, 18th, 21st, 24th to 27th.

Missouri valley: 4th, 5th, 18th to 22d, 25th, 26th.

Solar halos were also reported from the following stations, not included in the districts named above:

Albany, New York, 8th, 20th.
Key West, Florida, 4th, 24th.
Punta Rassa, Florida, 10th.
Fayette, Mississippi, 5th.
Palestine, Texas, 2d, 21st, 27th.
Tobacco Garden, Dakota, 6th, 25th.
Fort Keogh, Montana, 11th, 21st.
Fort Lyon, Colorado, 17th.
Santa Fé, New Mexico, 6th.
Yuma, Arizona, 23d.
Salt Lake City, Utah, 6th, 24th.
Coalville, Utah, 23d.
Carson City, Nevada, 4th, 9th.
Colfax, Washington Territory, 2d, 3d, 9th, 21st, 27th.
Lewiston, Idaho, 2d, 9th, 23d.
San Francisco, California, 5th, 9th, 10th, 13th, 20th, 22d, 23d, 26th.
San Diego, California, 20th, 22d, 23d.
Poway, California, 23d.
Princeton, California, 9th.

LUNAR HALOS.

Lunar halos have been observed in the various districts, on the following dates:

New England: 1st, 20th, 24th, 25th, 27th, 28th, 30th.
Middle Atlantic states: 3d, 18th, 21st, 22d, 25th, 26th, 27th.
South Atlantic states: 2d, 25th, 26th, 29th, 30th.
East Gulf states: 5th, 6th, 26th.
West Gulf states: 23d to 26th, 30th.
Ohio valley and Tennessee: 2d, 14th, 19th, 21st, 23d to 26th, 29th, 30th.
Lower lake region: 1st, 18th, 22d, 23d, 26th, 27th, 29th, 30th, 31st.
Upper lake region: 2d, 18th to 26th, 28th, 30th.
Extreme northwest: 20th, 21st, 25th.
Upper Mississippi valley: 1st, 18th to 22d, 24th to 28th.
Missouri valley: 1st, 2d, 3d, 20th, 21st, 24th to 27th, 29th.
Northern slope: 19th, 21st, 23d to 27th, 31st.
Middle slope: 2d, 21st, 24th, 25th.
Southern slope: 23d to 26th.
Southern plateau: 1st, 23d, 24th, 26th.
Middle plateau: 20th, 23d, 24th, 25th, 27th.
Northern plateau: 21st to 26th, 29th.
California: 3d, 22d, 23d, 25th, 31st.

Lunar halos were also reported from the following stations, not included in the districts named above:

Key West, Florida, 24th, 26th.
Eagle Pass, Texas, 18th.
Albany, Oregon, 19th, 20th, 23d.

MIRAGE.

Indianola, Texas, 8th, 10th, 11th.
Pretty Prairie, Kansas, 19th.
Genoa, Nebraska, 22d, 23d.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and eighty-two stations show 5,596 observations to have been made, of which twenty-two were reported doubtful; of the remainder, 5,574, or 85.6 per cent., were followed by the expected weather.

SUN SPOTS.

The following record of observations has been forwarded by Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Massachusetts:

DATE—Oct., 1882.	No. of new		Disappear'd by solar rotation.		Reappear'd by solar rotation.		Total No. visible.		REMARKS.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 12 m...	1	15	0	0	0	0	6	45‡	One spot very large.
2, 8 a. m...	0	0	0	0	0	0	6	45‡	Do.
3, 8 a. m...	1	5	1	2	0	0	6	50‡	Do.
4, 5 p. m...	0	0	0	10	0	0	6	40‡	Do.
5, 8 a. m...	1	1	0	0	1	1	7	40‡	Do.
6, 9 a. m...	0	0	1	10‡	0	0	6	30‡	Do.
6, 5 p. m...	0	0	0	5‡	0	0	6	25‡	Do.
7, 5 p. m...	0	0	2	12‡	0	0	3	5	Spots all small.
8, 1 p. m...	0	0	1	2	0	0	1	2	
9, 8 a. m...	0	0	0	0	0	0	0	0	No faculæ.
10, 8 a. m...	1	2	0	0	1	2	1	2	Do.
14, 7 a. m...	1	10	0	0	1	10	2	12	
15, 9 a. m...	0	5	0	0	0	5	2	17	
17, 4 p. m...	0	15‡	0	0	.....	.....	2	35‡	
18, 8 a. m...	1	10‡	0	0	0	0	3	45‡	
20, 5 p. m...	0	5	0	0	0	0	3	50‡	
21, 4 p. m...	1	1	0	0	0	0	4	50‡	
25, 8 a. m...	1	10	.....	.....	1	10	4	35‡	Spots probably reappeared by solar rotation. One spot very large.
26, 7 a. m...	0	0	1	10‡	0	0	3	25‡	One spot very large.
27, 8 a. m...	1	2	1	5	1	1	3	20‡	Do.
30, 7 a. m...	2	15‡	2	15‡	2	15‡	3	20‡	Do.
31, 4 p. m...	2	5	0	0	0	0	5	25‡	Do.

‡Approximated. Faculæ were seen at the time of every observation, except on the 9th and 10th.

The following record of observations has been forwarded by Mr. A. S. Bender, of Sacramento, California:

DATE—Oct., 1882.	No. of new		Disappeared by rotation		Reappeared by rotation.		Total No. of		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
2, 4 p. m...	1	1	.....	.....	.....	.....	5	25†	One group disappeared.
4, 4 p. m...	2	10	.....	.....	.....	.....	7	35†	
7, 3 p. m...	.....	.....	3	30	.....	.....	1	1	Three groups of one and two spots each, disappeared other than by rotation.
9, 4 p m	.....	.....	.....	.....	1	1	1	1	One group of one spot disappeared.
10, 4.45 p.m	.....	.....	.....	.....	.....	1	1	2	New spot of same group.
12, 4 p. m...	1	2	.....	.....	.....	.....	2	4	
13, 4 p. m...	1	15†	.....	.....	.....	.....	3	20†	
14, 4 p. m...	.....	.....	.....	.....	.....	.....	2	20†	One group of two spots disappeared.
15, 4 p. m...	1	10†	.....	.....	.....	.....	3	30†	
16, 4 p. m...	.....	10†	.....	.....	.....	.....	3	40†	
19, 4 p. m...	.....	10†	.....	.....	.....	.....	3	50†	Number of spots increased, some being very small and dim.
20, 4 p. m...	1	10†	.....	.....	.....	.....	4	60†	Several of these spots small and dim.
22, 4 p. m...	.....	.....	1	10	1	1	4	50†	New spot very large; came in by rotation. (Is one of those which disappeared on 6th or 7th instant.)
23, 4 p. m...	1	4	.....	.....	.....	.....	5	45†	
24, 4 p. m...	.....	.....	2	20	.....	.....	3	30†	Some very faint spots seem to attend the large one.
25, 4 p. m...	.....	.....	.....	.....	.....	.....	2	20†	Do.
27, 4 p. m...	2	3	.....	.....	.....	.....	4	25†	Do.
28, 4 p m...	1	10	2	20	.....	.....	3	25†	The above now appear about 10 in number, and are, for the first time, included in the total number.
29, 4 p. m...	.....	.....	.....	.....	.....	.....	3	10†	Spots increased in size and diminished in number, those attending the large spot have disappeared.
30, 4 p. m...	.....	.....	.....	.....	.....	.....	3	10†	
31, 5 p. m...	2	10†	.....	.....	.....	.....	5	20†	

† Estimated.

Mr. H. D. Glowey at North Lewisburg, Ohio, reports: Sun spots were observed on all clear days during the month. They were most numerous on the 1st, smallest and least numerous on the 9th, and largest on the 1st and 26th. Mr. I. R. Zimmermann, at Wicklow, Lake county, Dakota, reports that three large spots were observed with the unassisted eye on the sun's disk, on the 25th.

METEORS.

Augusta, Georgia, 27th: A brilliant meteor was observed at 8.10 p. m., which started from a point near the zenith, and exploded when about 10° above the northwestern horizon. No report was heard at its explosion and disappearance.

Moorhead, Minnesota, 4th: At 7.40 p. m., a very brilliant